

CHAPTER 9

OTHER ISSUES

9-1. Introduction. There are many considerations for MPE other than the technical aspects of the technology. These administrative items include legal and regulatory issues, patent issues, and safety issues. These issues are described in more detail below.

9-2. Legal and Regulatory.

a. State and federal regulatory requirements should be identified by the designer prior to operation of an MPE system. Regulations for different design processes will vary from site to site depending upon various regulations. Many states require that well permits be obtained, and that a licensed driller be used. In some cases, a licensed pump installer may even be required. Most states have regulations limiting air emissions from remediation systems, which will govern the method and extent of off-gas treatment required. Treated water disposal may also require permitting, especially when discharging to a sewer system or surface water. Such permit requirements may be set forth by local sewer commissions or by the National Pollution Discharge Elimination System (NPDES).

b. Permits or regulations may also apply when installing wells for use with MPE systems. Regulations for handling of investigation-derived wastes generated during site characterization are included under federal regulations promulgated by the Resource Conservation and Recovery Act (RCRA).

c. It is important to recognize that regulations vary among site locations and that working closely with the appropriate regulatory agency or agencies is the best way to ensure compliance with applicable regulations.

9-3. Patent Issues.

a. There are several patents that have been issued relative to technologies discussed in this EM. Readers are advised to consider the ramifications of these patents on their site activities. A first step toward this end is facilitated by a review of the summary of MPE and related patents that follows. If closer scrutiny is required, a copy of the patent can be obtained promptly from the U.S. Patent office (1) by mail for a minimal charge by calling (703) 305-4350, or (2) by visiting the patent server world-wide web site at <http://www.patents.ibm.com>. **Contact Office of Counsel for further guidance on addressing this issue.** The following list of patents with associated summary descriptions is not intended to represent a complete patent search. It is organized from a search of patents that most closely resemble technologies discussed in this EM. The Xerox® patents are discussed first and in considerably more detail since many TPE applications will either narrowly miss infringing on the patents or may require appropriate licensing for use of the technology. Note that the validity of any of the described patents has not been determined. The United States has authority to make use of any patented item or process in the course of any project, and cannot be refused use or enjoined from use of any patented item or process. Under the procedures of Title 28 United States Code 1498, a federal agency may be required to pay reasonable compensation for the use of any patented item or process. This is normally done by negotiation or determination of a reasonable fee to obtain the right to use the patented item or process under a license agreement.

Government contract clauses are prescribed for use in various types of contracts, which may require the contractor to obtain any applicable licenses, and may in some cases require the contractor to indemnify the government in the event of a claim for compensation from a patent or license holder. The Office of Counsel should be notified in the event of any questions or disputes related to patents.

b. Xerox Corporation. Process for Two Phase Vacuum Extraction of Soil Contaminants (# 5,050,676). This process uses one vacuum source to extract liquid and gases from a well as a single stream. The abstract below defines the process.

"A process for two phase vacuum extraction of contaminants from the ground involves vacuum withdrawal of liquid and gaseous phases as a common stream, separation of the liquid and gaseous phases, and subsequent treatment of the separated liquid and gases to produce clean effluents. Two phase vacuum extraction employs a single vacuum generating device to remove contaminants in both the liquid stream and soil gases through a single well casing." (U.S. Patent # 5,050,676)

c. Xerox Corporation. Process and Apparatus for Groundwater Extraction Using a High Vacuum Process (#5,172,764). This process utilizes a vacuum extraction pipe within the well (i.e., a drop tube) by which extract liquid and vapor. Gas is introduced to the well riser through a pipe exposed to the atmosphere. The abstract below defines the process.

"Disclosed is a process for removing contaminants from a contaminated area of the ground having a vadose zone and a water table which comprises providing a borehole in the contaminated area; placing in the borehole a perforated riser pipe inside of which is situated a vacuum extraction pipe with an opening situated near, at, or at any point below the water table within the perforated riser pipe, while introducing a gas into the riser pipe, applying a vacuum to the vacuum extraction pipe to draw gases and liquid from the soil into the perforated riser pipe and from the riser pipe into the vacuum extraction pipe and transport both the gases and the liquid to the surface as a common stream; forming from the common stream is a stream which is primarily gaseous; and separately treating the separated liquid and gas streams. Also disclosed is an apparatus for carrying out this process." (U.S. Patent #5,172,764)

d. Dames & Moore.

(1) Priming Methods for Vacuum Extraction Wells (#5,076,360). This process utilizes a priming tube that introduces atmospheric air near the bottom of the drop tube. The drop tube extracts both liquid and vapor in a common stream. The abstract below defines the process.

"Methods and apparatus for vacuum extraction of contaminants from the ground which, in a preferred embodiment, involves vacuum withdrawal of liquid and gaseous phases as a common stream, separation of the liquid and gaseous phases, and subsequent treatment of the separated liquid and gases to produce clean effluent. A primed vacuum extraction employs a single vacuum generating device to remove contaminants in both the liquid stream and soil gases through a single well casing utilizing a priming tube which introduces air or other gas to the liquid collected at the bottom of a well. The present invention permits vacuum extraction of both liquids and gases from the subsurface by way of wells having a

liquid layer which is more than thirty feet below the soil surface or in which a screened interval of the extraction pipe is entirely below the liquid surface." (U.S. Patent #5,076,360)

(2) This patent differs from both Xerox patents in that: (1) The extracted vapor is atmospheric and is not pulled entirely from the soil gas; and (2) The priming tube is inserted near the bottom of the extraction tube and not just into the top of the well casing.

e. R.E. Wright Environmental, Inc. Multiple Well Jet Pump Apparatus (#5,555,934). This process utilizes venturi jet pumps on each extraction well to create a vacuum and extract liquid and air from the subsurface. The abstract below defines the process.

"The apparatus is a pumping system for multiple wells which uses a single circulating pump and two or more venturi jet pumps, at least one jet pump for each well. The circulating pump furnishes feed water to the several jet pumps, with the vacuum line of each jet pump installed into a different feed well. Automatic level control within the well is furnished because when the liquid level falls, the jet pump vacuum line within the low level well draws air, and there is no effect on the pumping action of the jet pumps of other wells. Thus, if the level of liquid in a well drops, that pump simply pumps air and will resume pumping the liquid when the liquid once again covers the well pipe intake." (U.S. Patent #5,555,934)

f. Texaco, Inc. Multi-Phase Flow and Separator (#5,149,344). This apparatus separates a stream of multi-phase fluid into discrete components. The abstract below defines the process.

"A multi-phase separating apparatus for fluid containing a gaseous component. The apparatus includes a first tank which receives a stream of the multi-phase fluid which is to be resolved into discrete components. A second or separating tank positioned at a lower elevation than the first tank, receives a stream of substantially gas-free liquid. Said gas-free multi-liquid stream is conducted through a valved conduit. The latter includes a buoyant element which is displaceable by liquid in the lower tank, to form a barrier to avoid backflow or oscillatory fluid response of said liquid. Liquid accumulated in the lower tank thus maintains said tank in a substantially full condition. Liquid monitors in the separating tank monitor liquid levels and control outflow from the unit." (U.S. Patent #5,149,344)

This relates to MPE because separation methods of the extracted liquid and vapor stream may be similar to this patent.

g. BCM Engineers, Inc. Bootstrapping Process Optimization for Two Phase Vacuum Extraction Systems (#5,586,836). This process describes a system to separate the liquid and gas from a vacuum extraction system stream. The separated water is then recirculated and re-used as described in the abstract below.

"A system for receiving an effluent stream of liquids and gases from a vacuum extraction system is disclosed. The system uses the water separated from the effluent stream by a knock-out pot to cool recirculating water, provide seal water and/or providing make up water to a liquid ring vacuum pump that provides the suction for vacuum

extraction. In a preferred embodiment, a heat exchanger uses cool water from a knock-out pot to condense vapors and uses the warm water exiting the liquid ring vacuum pump to reheat the vapor stream, raising its temperature and thus lowering its relative humidity, resulting in more efficient contaminant removal by vapor treatment systems. The knock-out pot also preferably includes a free contaminant recovery system that collects and transfers liquid contaminants that separate from the water collected in the knock-out pot due to a difference between the contaminant density and the density of water. The contaminants thus collect as free product either floating on top of the water or sinking to the bottom of the knock-out pot." (U.S. Patent # 5,586,836)

9-4. Health and Safety. In order to analyze safety and health issues associated with MPE, the user of this EM should refer to safety and health hazard analyses of similar or related technologies as presented in the Remediation Technologies Screening Matrix and Reference Guide published by the Federal Remediation Technologies Roundtable, and available at <http://www.frtr.gov/matrix2/>. The generic physical, chemical, radiological, and biological hazards and controls identified in Sec. 4.41 Dual Phase Extraction, Chapter 10-2 of the Screening Matrix should be considered a baseline from which a unique project specific hazard analysis is developed. The project-specific hazard analysis should address all phases of MPE development, including predesign investigation, design, construction, and operation and maintenance. All hazards identified in all phases of MPE development, must be addressed in complying with applicable federal regulations, e.g., OSHA, NFPA, and USACE regulations including ER 385-1-92. Appendix B of ER 385-1-92 must be followed when drafting the related safety and health design documents, including any investigative Site Safety and Health Plans, Health and Safety Design Analyses, and the Safety, Health and Emergency Response contract specifications for MPE construction, based on CEGS 01551. Safety and risk assessment guidance for remediation systems involving contaminated air streams can be found in EP 1110-1-21.